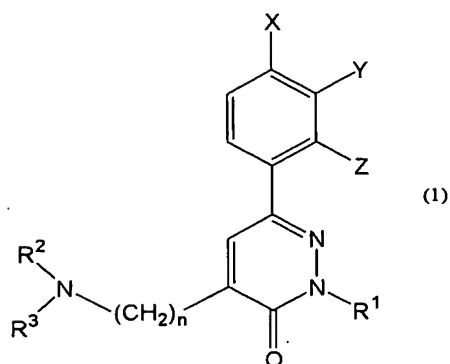


CLAIMS

1. A phenylpyridazine derivative represented by the formula (1):



wherein:

R^1 is optionally substituted or unsubstituted alkyl, or substituted or unsubstituted alkenyl;

R^2 and R^3 each independently represents hydrogen or alkyl, hydroxyalkyl, dihydroxyalkyl or alkynyl, or R^2 and R^3 are fused together with the adjacent nitrogen atom to form a substituted or unsubstituted, nitrogen-containing, saturated heterocyclic group;

X, Y and Z each independently represents hydrogen or halogen, substituted or unsubstituted alkyl, alkoxy, alkylthio, alkylsulfinyl or alkylsulfonyl, or substituted or unsubstituted aryl; and

n stands for a number of from 1 to 5;

with the proviso that R^2 and R^3 are not hydrogens or the same C_1 - C_3 alkyl groups at the same time when R^1 is a benzyl

group or a C₁-C₃ alkyl group; or a salt thereof.

2. The compound of Claim 1, wherein R¹ is substituted or unsubstituted alkyl having 1 to 7 carbon atoms or substituted or unsubstituted alkenyl having 2 to 7 carbon atoms.

3. The compound of Claim 2, wherein one or more substituents on said alkyl or alkenyl represented by R¹ are each independently aryl having 6 to 14 carbon atoms or 5- or 6-membered heteroaryl having 1 to 3 nitrogen atoms; and said aryl or heteroaryl groups are each substituted or unsubstituted by 1 to 3 substituents selected from the group consisting of halogen, alkyl and alkoxy.

4. The compound of Claim 1, wherein R² and R³ each independently represents hydrogen, alkyl, hydroxyalkyl, dihydroxyalkyl or alkynyl; or R² and R³ are fused together with the adjacent nitrogen atom to form a 5- or 7-membered, nitrogen-containing, saturated heterocyclic group, said heterocyclic group being substituted or unsubstituted with one or more halogen atoms, or alkyl, alkoxycarbonyl or aralkyl groups.

5. The compound of Claim 1, wherein X, Y and Z are each independently hydrogen, halogen, alkyl which is substituted or unsubstituted by one or more halogen atoms or alkoxy groups, alkoxy, alkylthio, alkylsulfinyl, alkylsulfonyl, or C₆-C₁₄ aryl which is substituted or unsubstituted by one or more halogen

atoms, or alkyl or alkoxy groups.

6. The compound of Claim 1, wherein R^1 is isobutyl, cyclopropylmethyl, cyclopentylmethyl, cinnamyl, halogenocinnamyl, benzyl, halogenobenzyl, dihalogenobenzyl or (halogenophenyl)propyl; R^2 and R^3 are each independently hydrogen, C_{1-7} alkyl, C_{1-7} hydroxyalkyl or propargyl; said heterocyclic group formed by R^2 and R^3 is pyrrolidinyl, piperazinyl, piperidino or morpholino which is substituted or unsubstituted by one or more C_{1-7} alkyl or benzyl groups; X is methyl, methoxy, methylthio or halogen; Y is hydrogen, methyl or halogen; Z is hydrogen; and n is 1 or 3.

7. The compound of Claim 1, which is
 4-dimethylaminomethyl-6-(3-fluoro-4-methylphenyl)-2-isobutyl-2H-pyridazin-3-one,
 2-cyclopropylmethyl-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,
 2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-(4-benzyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,
 4-N,N-bis(2-hydroxyethyl)aminomethyl-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,
 4-aminomethyl-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

4-dimethylaminomethyl-2-isobutyl-6-(4-methylphenyl)-2H-pyridazin-3-one,

4-diethylaminomethyl-2-isobutyl-6-(4-methylphenyl)-2H-pyridazin-3-one,

4-N,N-bis(2-hydroxyethyl)aminomethyl-6-(4-methylphenyl)-2-isobutyl-2H-pyridazin-3-one,

6-(4-fluoro-3-methylphenyl)-2-isobutyl-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

4-dimethylaminomethyl-6-(4-fluoro-3-methylphenyl)-2-isobutyl-2H-pyridazin-3-one,

4-N,N-bis(2-hydroxyethyl)aminomethyl-6-(3,4-difluorophenyl)-2-isobutyl-2H-pyridazin-3-one,

2-(4-chlorocinnamyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-cyclopropylmethyl-4-(4-methyl-1-piperazinyl)methyl-6-[4-(methylthio)phenyl]-2H-pyridazin-3-one,

4-N,N-bis(2-hydroxyethyl)aminomethyl-2-cyclopropylmethyl-6-[4-(methylthio)phenyl]-2H-pyridazin-3-one,

2-cyclopropylmethyl-4-dimethylaminomethyl-6-[4-(methylthio)phenyl]-2H-pyridazin-3-one,

2-isobutyl-6-[4-(methylthio)phenyl]-4-propargylaminomethyl-2H-pyridazin-3-one,

4-dimethylaminomethyl-2-isobutyl-6-[4-(methylthio)phenyl]-2H-pyridazin-3-one,

2-(4-chlorobenzyl)-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-cyclopentylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-cyclopentylmethyl-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-cyclopentylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,

4-aminomethyl-2-cyclopentylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

4-dimethylaminomethyl-2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,

4-aminomethyl-2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

4-aminomethyl-2-(4-chlorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-(3,4-difluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(3,4-difluorobenzyl)-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

6-(3-fluoro-4-methoxyphenyl)-2-[3-(4-fluorophenyl)propyl]-
 4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2-[3-(4-
 -fluorophenyl)propyl]-2H-pyridazin-3-one,
 4-N,N-bis(2-hydroxyethyl)aminomethyl-6-(3-fluoro-4-methoxy
 phenyl)-2-[3-(4-fluorophenyl)propyl]-2H-pyridazin-3-one,
 6-(3-fluoro-4-methoxyphenyl)-2-[3-(4-fluorophenyl)propyl]-
 4-(1-piperazinyl)methyl-2H-pyridazin-3-one,
 4-aminomethyl-6-(3-fluoro-4-methoxyphenyl)-2-[3-(4-fluorop
 henyl)propyl]-2H-pyridazin-3-one,
 2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-[4-(2-
 hydroxyethyl)-1-piperazinyl]methyl-2H-pyridazin-3-one,
 2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-met
 hyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-[3-(4-m
 ethyl-1-piperazinyl)propyl]-2H-pyridazin-3-one,
 2-cyclopropylmethyl-4-(3-dimethylaminopropyl)-6-(3-fluoro-
 4-methoxyphenyl)-2H-pyridazin-3-one,
 2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-[3-(1-p
 iperazinyl)propyl]-2H-pyridazin-3-one, or
 4-(3-aminopropyl)-2-cyclopropylmethyl-6-(3-fluoro-4-methox
 yphenyl)-2H-pyridazin-3-one; or a salt thereof.

8. The compound of Claim 1, wherein R¹ is a group selected
 from halogenobenzyl, dihalogenobenzyl, (halogenophenyl)ethyl,

(dihalogenophenyl)ethyl, (halogenophenyl)propyl or (dihalogenophenyl)propyl; $R^2(R^3)N-$ is a group selected from amino, dimethylamino, piperazinyl or N-methylpiperazinyl; X is halogen or methoxy; Y is methyl or halogen; Z is hydrogen; and n stands for 1 or 3.

9. The compound of Claim 1, wherein R^1 is a group selected from chlorobenzyl, dichlorobenzyl, fluorobenzyl, difluorobenzyl, (chlorophenyl)ethyl, (dichlorophenyl)ethyl, (chlorophenyl)propyl or (dichlorophenyl)propyl; $R^2(R^3)N-$ is a group selected from amino, dimethylamino, piperazinyl or N-methylpiperazinyl; X is halogen or methoxy; Y is methyl or halogen; Z is hydrogen; and n stands for 1 or 3.

10. The compound of Claim 1, which is:

2-[3-(4-chlorophenyl)propyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-[3-(2-chlorophenyl)propyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-[3-(3-chlorophenyl)propyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(4-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(2-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(2-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-[3-

(4-methyl-1-piperazinyl)propyl]-2H-pyridazin-3-one,

4-(3-aminopropyl)-2-(2-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-2H-pyridazin-3-one,

2-[2-(2-chlorophenyl)ethyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-[2-(4-chlorophenyl)ethyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(2,6-dichlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(2,6-dichlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,

4-aminomethyl-2-(2,6-dichlorobenzyl)-6-(4-fluoro-3-methylphenyl)-2H-pyridazin-3-one,

2-[3-(2,6-dichlorophenyl)propyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(3,4-difluorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

4-aminomethyl-2-(2-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-2H-pyridazin-3-one,

2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-[3-(4-methyl-1-piperazinyl)propyl]-2H-pyridazin-3-one,

2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-[3-(1-piperazinyl)propyl]-2H-pyridazin-3-one,

2-[3-(2-chlorophenyl)propyl]-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one

2-[3-(4-chlorophenyl)propyl]-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one

4-aminomethyl-2-[3-(2-chlorophenyl)propyl]-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

4-aminomethyl-2-[3-(4-chlorophenyl)propyl]-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-[3-(1-piperazinyl)propyl]-2H-pyridazin-3-one,

4-(3-aminopropyl)-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(3,4-difluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(3,4-difluorobenzyl)-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-[4-(2-hydroxyethyl)-1-piperazinyl]methyl-2H-pyridazin-3-one,

4-N,N-bis(2-hydroxyethyl)aminomethyl-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,

4-aminomethyl-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one, or

2-(4-chlorocinnamyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one; or

a salt thereof.

11. The compound of Claim 1, which is

2-[3-(4-chlorophenyl)propyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(4-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

4-(3-aminopropyl)-2-(2-chlorobenzyl)-6-(4-fluoro-3-methylphenyl)-2H-pyridazin-3-one,

2-[2-(4-chlorophenyl)ethyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-(2,6-dichlorobenzyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-[3-(2-chlorophenyl)propyl]-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,

2-[3-(4-chlorophenyl)propyl]-6-(3-fluoro-4-methoxyphenyl)

-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-4-[3-(1-piperazinyl)propyl]-2H-pyridazin-3-one,
 4-(3-aminopropyl)-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,
 2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-(3,4-difluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-(3,4-difluorobenzyl)-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,
 2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
 2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-[4-(2-hydroxyethyl)-1-piperazinyl]methyl-2H-pyridazin-3-one,
 4-N,N-bis(2-hydroxyethyl)aminomethyl-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,
 4-aminomethyl-2-cyclopropylmethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one, or
 2-(4-chlorocinnamyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one; or a salt thereof.

12. The compound of Claim 1, which is
2-(3,4-difluorobenzyl)-4-dimethylaminomethyl-6-(3-fluoro-4-methoxyphenyl)-2H-pyridazin-3-one,
2-(4-chlorocinnamyl)-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
2-(4-fluorobenzyl)-6-(3-fluoro-4-methoxyphenyl)-4-(1-piperazinyl)methyl-2H-pyridazin-3-one,
2-[3-(4-chlorophenyl)propyl]-6-(4-fluoro-3-methylphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one,
2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-(4-methyl-1-piperazinyl)methyl-2H-pyridazin-3-one, or
2-(4-chlorocinnamyl)-6-(3-fluoro-4-methoxyphenyl)-4-[4-(2-hydroxyethyl)-1-piperazinyl]methyl-2H-pyridazin-3-one; or a salt thereof.

13. A medicine comprising as an active ingredient the compound of any one of claims 1-12 or a salt thereof.

14. The medicine of claim 13, which is a preventive or therapeutic for a disease caused by stimulation of interleukin-1 β production.

15. The medicine of claim 13, which is a preventive or therapeutic for immune system diseases, inflammatory diseases, ischemic diseases, osteoporosis, or ichorrhemia.

16. The medicine of claim 13, which is a preventive or therapeutic for rheumatism, arthritis or inflammatory colitis.

17. An interleukin-1 β production inhibitor comprising as an active ingredient the compound of any one of claims 1-12 or a salt thereof.

18. A pharmaceutical composition comprising the compound of any one of claims 1-12 or a salt thereof and a pharmacologically acceptable carrier.

19 The pharmaceutical composition of claim 18, which is a pharmaceutical composition for the prevention or treatment of a disease caused by stimulation of interleukin-1 β production.

20. The pharmaceutical composition of claim 18, which is a pharmaceutical composition for the prevention or treatment of immune system diseases, inflammatory diseases, ischemic diseases, osteoporosis, or ichorrhemia.

21. The pharmaceutical composition of claim 18, which is a pharmaceutical composition for the prevention or treatment of rheumatism, arthritis or inflammatory colitis.

22. Use of the compound of any one of claims 1-12 or a salt thereof for the production of a medicine.

23. A method for treating a disease caused by stimulation of interleukin-1 β production, which comprises administering the compound of any one of Claims 1-12 or a salt thereof.